APPENDIX E

LAKE MICHIGAN TMDL STRATEGY PLANNING DOCUMENT

Lake Michigan TMDL Strategy Planning Document

1.0 Introduction

This strategy planning document identifies the goals, objectives, processes, and key issues related to the development and use of Total Maximum Daily Loads (TMDL) for the open waters of Lake Michigan. The procedures outlined in this document are consistent with those stipulated under the Water Quality Guidance for the Great Lakes System (40 CFR Part 132, Appendix F) and other U.S. Environmental Protection Agency regulations, policy, and guidance promulgated or published under the authority of Section 303 of the Clean Water Act (CWA).

TMDLs for tributaries to Lake Michigan are being addressed by the states. Nonetheless, TMDL activities related to those tributaries are included in this document because of their importance to the quality of the open waters of the lake.

This document is intended to generate discussion and will guide the development of the final TMDL Strategy for Lake Michigan. The strategy will map out a plan to coordinate the work of EPA, the states, and other interested stakeholders involved in the TMDL process. The strategy will not discuss TMDL implementation; that will be part of any TMDL that is ultimately developed. Furthermore, since a TMDL is only one of many tools discussed below for managing the Great Lakes, other protection and restoration efforts will not wait for the development of a TMDL and may eventually make a TMDL for the open waters of the lake unnecessary. As a result, this document is only the first step in a lengthy process.

This strategy planning document is organized in six sections and one appendix. Following this introduction, Section 2.0 provides background on the status of Lake Michigan and 303(d) listed water segments within the Lake Michigan watershed. Section 3.0 describes the TMDL process and compares it with the Lakewide Management Plan (LaMP) program goals defined under the Great Lakes Water Quality Agreement (GLWQA). Section 4.0 describes the key issues to be resolved to develop a Lake Michigan TMDL Strategy. Section 5.0 presents a framework for a TMDL strategy to serve as a "strawman" for generating discussion and comment. Section 6.0 briefly describes the next steps in the TMDL strategy development process. Finally, Appendix A lays out the key steps in the TMDL process.

General Relationship Among a TMDL Strategy and Other Management Programs and Tools

The TMDL Strategy will address one of many tools that can be used to manage Great Lakes ecosystem quality. The following discussion generally outlines the statutory basis for water quality management and the variety of tools for addressing water quality impairment in the lakes. The Lake Michigan LaMP describes those programs and activities in greater detail. This introductory discussion is intended to place the TMDL program within the larger context of Great Lakes management.

Statutory Authorities: Setting Goals

The CWA provides the overall goals (fishable, swimmable, and drinkable) and authority for regulating certain activities that affect clean water in this country. In addition, the GLWQA between the United States and Canada defines more specific and common goals for the Great Lakes basin. The states and tribes use the provisions of the CWA for designating water body uses and the necessary standards to be met to support those uses. Any request for a National Pollutant Discharge Elimination System (NPDES) permit to discharge into a water body is judged against the designated use for the receiving water body and the adopted state standards. Within the Great Lakes Basin, those water quality standards must meet the common Great Lakes Water Quality Guidance objectives, including: 1) being no less restrictive than the limits on pollutants that protect human health, aquatic life, and wildlife; 2) encompassing anti-degradation policies; and 3) incorporating implementation procedures.

Tools: Regulatory, Non-regulatory, and Voluntary Approaches to Pollution Control

Under the statutory authorities governing lake water quality management, a variety of regulatory and non-regulatory programs are implemented at the federal, state, and local levels. In addition, the public and private sectors implement voluntary pollution reduction programs and strategies to reduce pollutant load to the lakes. Several of those programs are described below.

Water Discharge Permitting. The CWA prohibits discharges of "pollutants" through a "point source" into a "water of the United States" unless the discharge is authorized under a NPDES permit. The permit specifies limits on effluent concentrations and loads, monitoring and reporting requirements, and other provisions to ensure that the discharge does not impair water quality or human health. In essence, the permit translates general CWA requirements into specific provisions tailored to the operations of each entity discharging pollutants. Illinois, Indiana, Michigan, and Wisconsin all have been delegated their NPDES permit programs and are authorized to issue permits.

TMDL - Achieving Water Quality Standards. For those waters not meeting quality standards after application of wastewater treatment technology mandated through an NPDES permit, states are required to calculate a TMDL. TMDL calculations are usually complex and may address a variety of pollutant sources. Although the states have primary responsibility for performing TMDLs, EPA will provide resources for technical assistance to assist in developing TMDLs, including TMDLs for interstate waters like the Great Lakes.

Technical and Economic Assistance. Reductions of pollutant load to the Great Lakes are also supported through technical and economic assistance provided by the basin governments. For example, Section 319 of the CWA authorizes EPA to provide funds to the states for nonpoint source control project grants. Similarly, the U.S. Department of Agriculture provides economic assistance through the Environmental Quality Incentives Program to aid in controlling

agricultural runoff. Overall, scores of federal, state, local, and private assistance programs are available to help reduce pollutants and control pollutant load to the lakes.

Pollution Prevention Partnerships. Partnerships among governments, the private sector, and other interested stakeholders help achieve voluntary pollution reductions. For example, through Partners for the Environment, EPA collaborates with more than 7,000 organizations that use voluntary goals and commitments to achieve measurable environmental results in a timely and cost-effective way. Partners include small and large businesses, citizens groups, state and local governments, universities, and trade associations.

The results of voluntary actions taken through more than 20 distinct partnership programs are impressive. Focusing on pollution prevention, organizations set and reach environmental goals such as conserving water and energy or reducing greenhouse gases, toxic emissions, solid wastes, indoor air pollution, and pesticide risk.

Tools: Assessing Watershed Conditions

In addition to placing controls on pollutant load to the lake, new programs are in place to improve the long-term assessment of water quality conditions in the basin. The 1998 Clean Water Action Plan (CWAP) began the process of developing *unified watershed assessments* based on the consolidation of information for a whole *watershed* from federal, state, tribal and intergovernmental groups assessment tools. These assessments build upon the data collection, assessment, and reporting activities mandated under Sections 305(b), 303(d), and 304(l) of the CWA. The plan identifies unified watershed Categories I through IV. The categories are: I) not meeting clean water and other natural resources goals, II) prevention action is needed to sustain water quality and aquatic resources, III) outstanding resource waters that deserve the highest protection and IV) watersheds with insufficient data.

Tools: Restoring Degraded Portions of the Lake Michigan Ecosystem

Finally, restoration activities administered by the federal government and the States are also an integral part of Great Lakes management. In particular, CERCLA has provided authority and funding to support sediment and other remediation in the Areas of Concern and other degraded areas within the basin. The CWAP calls for states and tribes, working with all appropriate agencies, organizations, and the public, to identify the Category I watersheds most in need of restoration, beginning in the 1999-2000 period. A schedule will be developed and coordinated with the list of waters that do not meet State Water Quality Standards under section 303(d) of the CWA.

Coordinating Lake Management Activities through Planning

The CWAP and the Lake Michigan Lakewide Management Plan both call for working with numerous federal agencies, states, tribes, and other organizations to address the impairments. For the portions of Lake Michigan that require a TMDL, the LaMP Technical Coordinating Committee will function as the convening and coordinating committee to address Lake Michigan issues. Data from the Lake Michigan Mass Balance Study and Enhanced Tributary Monitoring Project will be added to the 1999 unified assessments to identify any outstanding data gaps. The time frame for filling the data gaps and the resources available will help determine the TMDL strategy and schedule for Lake Michigan. The following discussion provides a starting point for the TMDL Strategy development process.

2.0 Background - Status of Lake Michigan and State TMDL Programs

Lake Michigan supports many beneficial uses, including recreation, drinking water supply, ecological habitat, and certain industrial and commercial uses. Nonetheless, despite overall reductions in conventional and toxic pollutant loads to Lake Michigan over the past 20 years, data indicate that pollutants still exert negative impacts on the chemical, physical, and biological components of the Lake Michigan ecosystem. The remaining problems in Lake Michigan are significantly related to legacy contamination. Specifically, the lake ecosystem contains contaminants at levels that result in fish consumption advisories, impairments to aquatic organisms and wildlife, seasonal beach closures, and contamination of drinking water sources.

Fish consumption advisories for Lake Michigan are generally the result of elevated levels of PCB and mercury in fish. Fish consumption advisories for these chemicals also are used for the tributaries of Lake Michigan. In addition to PCBs and mercury, chlordane, dioxins, dieldrin, DDT and metabolites, and furans are considered level 1 critical pollutants in Lake Michigan. However, only those pollutants that are listed on one or more States' 303(d) lists for the open waters of the lake will be included in a TMDL completed for the lake.

Other pollutants cause or contribute to use impairment on a local or regional scale in Lake Michigan. In addition, some pollutant loadings are of concern in Lake Michigan, but do not necessarily exceed water quality standards. Those pollutants of concern include: hexachlorobenzene, toxaphene, cadmium, copper, arsenic, PAHs, chromium, zinc, and cyanide. Atrazine, PCB substitute compounds, and selenium are toxic substances that have characteristics indicating a potential to impact the physical or biological integrity of Lake Michigan. Those three compounds are considered emerging pollutants. Finally, pathogens, such as *E. coli* and *Cryptosporidium*, have caused beach closings and tainted drinking water along the coast of Lake Michigan, and nutrient loading remains a problem in certain near-shore areas and embayments, rivers, and lakes.

303(d) Listed Water Segments

Lake Michigan and many of its tributaries are impaired and do not meet water quality standards for PCBs, mercury, and other constituents. Waters that do not meet water quality standards require a state-developed TMDL for each water body and pollutant. Table 1 lists the impaired water segments, both Lake Michigan segments and tributaries discharging directly into Lake Michigan; the parameters of concern resulting in the state's identification of the impaired or threatened water body under Section 303(d) of the CWA; and the schedule for completing the TMDL for the water body. Table 1 includes those listed water bodies that discharge into Lake Michigan.

Table 1. Lake Michigan State 303(d) List Summaries

State	Water Body	Schedule	Parameters of Concern								
			WQS-PCBs	WQS-Mercury	FCA-PCBs	FCA-Mercury	E. Coli	Lead	Pesticides	D.O.	Other
WI	Fox River	2 years			✓					✓	Turbidity, aquatic toxicity
	Black River			✓						✓	
	Green Bay	2 years			✓					✓	Bacteria
	Kewaunee River				✓						
	Kewaunee Harbor										Aquatic toxicity, FCA
	Kewaunee Marsh										Aquatic toxicity, wildlife
	Lake Michigan										Multiple
	Little Menominee										Aquatic toxicity
	Manitowoc River	2 years (South Branch)			✓						
	Menominee AOC										FCA-arsenic, habitat loss
	Milwaukee Estuary				✓						Toxicity, habitat loss
	Oak Creek										Aquatic toxicity
	Oconto River					✓					
	Peshtigo River					✓					
	Pike River										Fish kills, toxicity
	Racine Harbor										Aquatic toxicity, FCA
	Root River				✓					✓	
	Sheboygan River	2 years			✓	✓					
	Sturgeon Bay										Aquatic toxicity
	Two Rivers Harbor										Aquatic toxicity, FCA

Table 1. Lake Michigan State 303(d) List Summaries (Continued)

State	Water Body	Schedule	Parameters of Concern								
			WQS-PCBs	WQS-Mercury	FCA-PCBs	FCA-Mercury	E. Coli	Lead	Pesticides	D.O.	Other
MI	Grand River	2003, 2008	✓		✓					✓	CSO, pathogens, untreated sewage, macroinvertebrate rated poor
	Kalamazoo River	2006	✓	✓	✓						
	Lake Michigan										FCA
	Manistee Lake	2006									CSO, pathogens, untreated sewage
	Manistique River	1999, 2011	✓	✓	✓	✓					CSO, pathogens, untreated sewage
	Menominee River	2009, 2010	✓	✓	✓	✓					CSO, pathogens, untreated sewage, FCA-TCDD
	Black River	1999			✓						chlordane
	Galien River	2009			✓						
	Mona Lake	2009			✓						
	Muskegon Lake	2008, 2010	✓	✓							
	Pere Marquette River	2008, 2010	✓	✓							
	Sawyer Creek	2003									macroinvertebrate rated poor
	St. Joseph River	2003, 2007, 2009	✓	✓	✓						CSO, pathogens, untreated sewage, poor macroinvertebrate
	White Lake	2009			✓						FCA-chlordane
IN	Grand Calumet River	1998-2000			✓	✓		✓	✓	✓	Cyanide, oil and grease, copper, impaired biotic, ammonia, chlorides

Table 1. Lake Michigan State 303(d) List Summaries (Continued)

State	Water Body	Schedule	Parameters of Concern								
			WQS-PCBs	WQS-Mercury	FCA-PCBs	FCA-Mercury	E. Coli	Lead	Pesticides	D.O.	Other
	Lake Michigan	2000-2004			✓	✓	✓				
	Indiana Harbor	1998-2000			✓	✓		✓	✓	✓	
	Little Calumet River	2000-2004					✓		✓	✓	Cyanide
IL	Lake Michigan										
	Waukegan River - South Branch										Priority organics, metals, habitat alterations

Notes: CSO = Combined Sewer Overflow
FCA = Fish Consumption Advisory

Water Quality Standards Applicable to Lake Michigan

Under the Water Quality Guidance for the Great Lakes System, the Great Lakes states and tribes are to adopt numeric water quality criteria and water quality programs that are consistent with the stipulations of 40 CFR Part 132. As a result, once approved by EPA water quality standards (WQS) for constituents identified under 40 CFR 132.3 promulgated by the states and tribes for waters in the Lake Michigan system will be consistent with the minimum requirements of 40 CFR Part 132. Water quality standards currently promulgated by the states are found at the following:

Illinois

The State of Illinois sets WQSs and methods for calculating standards and criteria for Illinois waters in the Lake Michigan Basin and Lake Michigan under 35 Illinois Administrative Code (IAC) Subpart E. The waters of the Lake Michigan Basin that must meet these WQSs include: the open waters of Lake Michigan within the jurisdiction of Illinois lakeward from a line drawn across the mouth of tributaries to Lake Michigan, but not including waters enclosed by breakwaters; Lake Michigan harbors and waters within the jurisdiction of Illinois; and waters tributary to Lake Michigan. The Chicago River, the North Shore Channel, and the Calumet River of are not included in the Lake Michigan Basin.

Indiana

The State of Indiana sets WQSs and methods for calculating standards and criteria for all Indiana waters within the Great Lakes system under 327 Indiana Administrative Code 2-1.5. The standards address all Indiana waters within the Lake Michigan Basin. The goal of the state is to restore and maintain the chemical, physical, and biological integrity of those waters.

Michigan

The State of Michigan sets WQSs and methods for calculating standards and criteria for the Great Lakes, connecting waters, and all other surface waters of the state under Part 4 of the Natural Resources and Environmental Protection Act, Act 451 of 1994.

Wisconsin

The State of Wisconsin sets WQSs and methods for calculating standards and criteria for Wisconsin surface waters under the Wisconsin Administrative Code (WAC) Chapter Natural Resources (NR) 102. WAC Chapter NR 104 sets uses and designated standards for intrastate and interstate waters, and WAC Chapter NR 105 sets surface water quality criteria and secondary values for toxic substances. All surface waters within the drainage basin of the Great Lakes are to be protected from the impacts of persistent, bioaccumulating toxic substances by avoiding or limiting to the maximum extent practicable increases in those substances.

3.0 The Relationship Between TMDL and the LaMP Processes

This section first describes the key elements that a Lake Michigan TMDL strategy must address. The section then provides an overview of the twelve key components or steps in TMDL development. The section concludes with a comparison of the TMDL and LaMP processes.

Key Elements of a TMDL Strategy

Any TMDL strategy developed for Lake Michigan should focus on five key elements: 1) Goals and Objectives, 2) Scope and Scale, 3) Monitoring and Data, 4) Coordinated Planning Efforts, and 5) Partnerships.

GOALS AND OBJECTIVES: If the TMDL process is to be successful, sound and achievable goals and objectives must be identified. Several statutory and planning processes have established goals and objectives, along with specific substances identified as critical pollutants that need to be controlled or eliminated. Strategically, it will be important to evaluate all of the associated goals and objectives under the various planning processes to ensure that there are no conflicts. It is also important to evaluate all of the substances identified as pollutants to determine which ones can or should be readily controlled through a TMDL process, and which ones will need to be managed though some other process. As part of a strategic planning process, it will be important to narrow down the goals and objectives, as well as the substances identified as critical pollutants, into a clear and concise suite that fits under the guidelines for waterbodies or waterbody segments needing TMDLs. The TMDL process is just one of many tools used to address specific goals and objectives and certain identified critical pollutants that are currently causing an impairment to meeting the designated uses of the Great Lakes and their basins. The development of TMDCs does not preclude the use of other mechanisms that will be used to attain of the other goals and objectives that have been set forth for the Great Lakes and their basins by the various planning and statutory processes.

Those statutory and planning processes that have identified goals and objectives, along with identified critical pollutants, include:

1) The designated uses of the waterbody or waterbody segment as established by the states along with the applicable water quality standards and criteria associated with the identified designated uses (which are to be consistent with the Water Quality Guidance for the Great Lakes System, 40 CFR Part 132).

2) The Great Lakes Initiative, which established final water quality guidance for the Great Lakes Systems for criteria limits or methodologies for the control of bioaccumulative chemicals of concern (BCC), EPA, March 1995.

3) The GLWQA, which identifies both the 14 beneficial uses for the Great Lakes and the requirement for no increase in toxic loads, 1972, and the amendments of 1978 and 1987.

4) The International Joint Commission (IJC), 1987, which identified substances as critical pollutants.

5) The Great Lakes Binational Toxics Strategy, which focuses on the virtual elimination of persistent toxic substances in the Great Lakes.

6) The Area of Concerns and their corresponding Remedial Action Plans (RAPs) which have identified goals and objectives.

7) The goals and objectives identified in the LaMPs along with the substances designated as lakewide critical pollutants.

8) The goals and objectives of the Source Water Protection Planning process.

9) The goals and objectives set forth in the CWAP, which has defined key actions and milestones.

SCOPE AND SCALE: Because of the large geographic size of the Great Lakes and their basins, and the complexity of the impairments and sources of those impairments, it is necessary to clearly identify both the scope and scale that can be managed by the TMDL process. It is also important to understand that the TMDL process functions through the use of a mathematical model that at best can only predict possible results, but not necessarily actual results.

First, the scope of the overall TMDL process within the lake and its basin should be defined. Beyond defining the impairments, it is important that both the causes and sources of the impairments be identified. Therefore, the initial scope should focus on three main categories as possible sources of impairment: tributaries, air deposition, and in-place or legacy pollutants. Under each one of those categories, additional sources can be further defined, such as point and nonpoint sources for tributaries, local and distant point and nonpoint sources for air deposition, and sites at which in-place pollutants are present, such as AOCs or Superfund sites. Each of those issues could then be addressed by the TMDL process within an identified scale.

MONITORING AND DATA: Because the Great Lakes are a very complex system, the need for sound, scientifically credible data is critical to the ability to produce TMDLs that result in reasonable load allocations that fall within an acceptable confidence range. It is also important that the data used in the modeling component of a TMDL be scientifically sound and credible. That consideration is especially important because the loads that are to be allocated for control are in some cases regulatory. It is also very important that the data be of high quality, since the implementation plans associated with the load allocations should reasonably result in water quality improvement and meet WQS.

COORDINATED PLANNING EFFORTS: Because of the many issues associated with

maintaining and protecting the water quality of the Great Lakes and their associated basins, numerous planning efforts are currently ongoing. Some of those planning efforts were defined under the goals and objectives section of this document. Other planning efforts will include the TMDL implementation plans and any program activities that may or may not be incorporated into the TMDL implementation plans.

Effectively implementing this process will require committed leadership and the ability to develop and maintain good partnerships.

PARTNERSHIPS: To develop Great Lake TMDLs and ensure effective implementation of the TMDL implementation plans, effective partnerships must be developed. To establish effective partnerships for both the development and the implementation of TMDLs within the Great Lakes and their associated basins, the following strategic approach is presented.

1) Identify the lead agency or agencies that will be responsible for developing and maintaining the needed partnerships for developing and implementing the TMDL process.

2) Identify the partners needed and define their roles and responsibilities ensuring the effective development and implementation of the TMDLs and the TMDL implementation plans.

3) Identify the partners in two major categories: those that would function in a statutory or regulatory mode and those that would function in a voluntary mode.

4) Evaluate the partners' resource capability in being able to carry out their defined roles and responsibilities. When there is a lack of resources, determine the options that might be available to assist or reinforce resource capabilities for partners.

5) Develop and define a forum through which partners can be brought together to exchange information and work effectively to develop and implement TMDLs.

Components of a TMDL

Section 303(d) of the CWA, EPA's implementing regulations at 40 CFR Part 130, and the Water Quality Guidance for the Great Lakes System (40 CFR Part 132) describe the statutory and regulatory requirements for approvable TMDLs. The minimum components of a TMDL are outlined in Appendix A of this document and include the following:

1) Description of Waterbody, Impairment or Standard Violation, Pollutant of Concern, Pollutant Sources, and Priority Ranking
2) Description of TMDL Endpoints -- Applicable Water Quality Standards and Numeric Quality Targets
3) Loading Capacity - Linking Water Quality and Pollutant Sources
4) Load Allocations (LA)
5) Wasteload Allocations (WLA)
6) Margin of Safety (MOS)
7) Seasonal Variation
8) Monitoring Plan for TMDLs Developed Under the Phased Approach
9) Implementation Plans (recommended under current policy)
10) Reasonable Assurances of Implementation
11) Public Participation
12) Submittal Letter

In addition, 40 CFR Part 132 establishes specific requirements related to TMDL development in the Great Lakes Basin..

Revisions of the TMDL process are expected in the year 2000. New regulations have been proposed that will change requirements under the Section 303(d) lists and for TMDLs. Under the proposed regulations, the states are responsible for developing the list of impaired or threatened waters every two years (this requirement may change). Impairment is defined as those waters that do not meet the standards for their designated use or the appropriate WQS.

The LaMP process is outlined under the GLWQA of 1978. Under the GLWQA, as amended by the Protocols of 1983 and 1987, the United States and Canada (the Parties) agreed ". . . to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem." To achieve that purpose, the Parties agreed to develop and implement, in consultation with state governments, provincial governments, and tribes, LaMPs for open lake waters.

In the case of Lake Michigan, the only Great Lake wholly within the borders of the United States, the LaMP development effort has been led by the United States, as called for in Section II of the CWA. As specified in Annex 2 of the GLWQA, the LaMP for Lake Michigan is designed to reduce loadings of critical pollutants to restore 14 designated beneficial uses and prevent increases in pollutant loadings in areas in which the specific objectives of the agreement are not exceeded. Moreover, the Specific Objectives Supplement to Annex I of the GLWQA requires the development of ecosystem objectives for Lake Michigan. Pursuant to that charge, the Lake Michigan LaMP embodies a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses by seeking a balance between critical pollutant reduction and ecosystem sustainability in open lake waters and the watersheds that comprise the lake basin.

Comparison of the TMDL and the LaMP Processes

The TMDL and the LaMP processes are fundamentally similar, but there are several key distinctions between them:

1) Both processes are intended to achieve clearly defined endpoints -- a water quality standard or numeric water quality target in the case of a TMDL, and a set of ecosystem objectives under the LaMP. However, the TMDL endpoints focus solely on water quality standards, while the LaMP considers other ecosystem objectives in addition to numeric water quality targets. For example, the LaMP calls for the removal of restrictions on consumption of fish and wildlife, prevention of deformities or reproductive problems, and protection of the benthos. As a result, the LaMP process has identified more than 20 critical pollutants to serve as the focus for management activities, while a TMDL for the open waters of the lake will focus on only those pollutants that are linked to exceedances of WQSs.

2) Both processes require a documented status of the ecosystem.

3) Management planning to achieve ecosystem objectives is a key component of the LaMP. Implementation planning is recommended under the TMDL process and may be a required part of an approvable TMDL under the proposed regulations. However, planning is currently not the central focus of a TMDL.

4) Developing a direct link between pollutant load and achievement of the endpoint, often through water quality modeling, is a critical component of a TMDL. In contrast, the LaMP describes the relationship between loading and achievement of an ecosystem objective as a partnership effort involving the governments, tribes, and non-governmental sectors of the basin.

5) Both processes require an integrated monitoring plan for the lake. In 1999, the Lake Michigan Monitoring Coordinating Council was established to provide coordination and support for monitoring across agency and jurisdictional boundaries.

6) Both processes require data, but the data are to be measured against different objectives. The Lake Michigan Mass Balance Study provides actual water column, sediment, and biota concentration data, and the models scheduled to be run in 2000 will provide mass budgets, time concentrations, and load response.

In sum, the TMDL and LaMP processes are intended to achieve the common objective of restoring the Lake Michigan ecosystem. However, a TMDL defines ecosystem protection more narrowly through the application of WQSs and places great emphasis on understanding the relationship between pollutant load and achievement of the standard. In contrast, the LaMP defines ecosystem protection and restoration more broadly and places greater emphasis on pollution control planning and developing implementation targets.

4.0 Issues to Be Resolved

The Lake Michigan LaMP Technical Coordinating Committee has identified a number of key issues to be resolved to better coordinate LaMP and TMDL activities (options for addressing each of these issues will be developed under the TMDL Strategy).

Issue 1: Identifying roles and responsibilities for each of the listed waters: tributaries, nearshore waters, open waters of the lake.

Issue 2: Should the lake be partitioned into segments that would be easier and more efficient to address with TMDLs?

Issue 3: Encourage consistency in 303(d) listing procedures among the States.

Issue 4: Maintain consistency in endpoint determinations (water quality standards) among the States.

Issue 5: Review the use of mass balance studies (e.g., the Green Bay and Lake Michigan Mass Balance Studies) and review their applicability to support a TMDL.

Issue 6: Integrate with other Programs (e.g., Source Water Protection Program).

Issue 7: Clarify the relationship between LaMP restoration and protection goals and TMDL endpoints (water quality standards).

- 20 LaMP critical pollutants vs. water quality standards exceedances

Issue 8: Investigate options for addressing air deposition of TMDL pollutants.

Issue 9: Develop approaches for determining margin of safety when addressing fish consumption advisories.

Issue 10: Maintain consistency among the five Great Lakes.

Issue 11: Define the role of the Tribes in the TMDL process.

5.0 Strawman Framework for a Lake Michigan TMDL Strategy

As a means of generating discussion about the likely components of a Lake Michigan TMDL strategy, the following “strawman” framework is offered. Throughout this process, opportunities

for public participation must be provided when identifying impaired water bodies, setting TMDL endpoints, and allocating loads. Public involvement in eventual development of implementation plans is also critical (see Appendix A).

Process

The process of developing the TMDLs for the Great Lakes will include the following steps:

1) Identify the impairments.

2) If at all possible, identify impaired segments.

3) Approve the listing of the segment under Section 303(d).

4) Generate the TMDL.

A) Determination of sources: While air deposition of mercury and PCBs may pose the largest portion of the load of those two pollutants to the lakes, other sources must be identified. In addition, other portions of the lakes were identified on the 1998 lists for impairments other than fish consumption advisories.

B) Determination of loads from the sources:

Significant amounts of data regarding the Great Lakes already exist, much generated during the LaMP process. Additional information about air deposition of mercury is being gathered through the Devil's Lake Pilot Project. Data from that project, as well as other air deposition mercury projects, will be incorporated, as generated, into the development of any appropriate TMDL.

Numerous TMDLs are scheduled for tributaries to the various Great Lakes. Those efforts will certainly result in the generation of addition data on loading of pollutants to the Great Lakes, as well as bringing about lower loadings as the TMDLs are implemented.

Although a large quantity of data is available, significant data gaps have been identified. The data gaps include:

1) Relevant information about TMDLs or mass balance activities for interstate or other waters that may contribute insight into TMDLs for Great Lakes listed waters

2) Discussion of impairments listed in LaMPs and the TMDL lists, and the relationship to state standards

3) Air deposition data for mercury and PCBs in the Great Lakes Basin

As the process moves forward, numerous data gaps will certainly be noted. As they are noted, it will be important to determine whether the data exist elsewhere, and if not, who should be working to gather the data (federal or state authorities, a contractor, or another entity)

C) Determination of the maximum load that will not cause a violation of WQSs

D) Allocation the load to the various sources

E) Development of an implementation plan to ensure the TMDL is carried out

Time Frame -

A 15-year time frame is available to complete a TMDL. Is that timeframe consistent with state expectations?

Roles and Responsibilities -

Some states have indicated in their 303(d) lists that EPA is responsible for developing the Great Lakes TMDLs for air deposition pollutants, while other states have made a more qualified statement.

Federal role: The federal role in the Great Lakes TMDL process is, at a minimum: 1) approve or disapprove 303(d) lists and 2) approve or disapprove the TMDLs. If the lists or TMDLs are disapproved, and EPA has the responsibility to issue appropriate lists or TMDLs. However, the Federal role will be much larger than that stated above. The EPA will take the lead on "open water" TMDLs, facilitate the generation of the TMDLs, provide funding through various mechanisms, assist in data gathering (especially for air deposition pollutants), provide technical support, coordinate efforts among the states, serve as an information repository, and provide legal analysis and support.

State role: List impaired waters, take the lead on tributary water TMDLs, and provide support and data for "open water" TMDLs.

6.0 Next Steps in the TMDL Development Process

This document is only the first step in the process to develop a TMDL strategy for Lake Superior. EPA envisions the following next steps in the process:

1) Gather comments on this strategy planning document and the issues identified in Section 4.0 of this document.

2) Convene regulators in the Fall of 2000 to begin discussions on the following:

    a) The outstanding issues identified in Section 4.0 of this document,
    b) Plans for a Winter 2001 information meeting
    c) Plans for future stakeholder meetings
    d) Clarification resource needs and availability
    e) Investigation of the formation of work groups

3) Convene an information meeting in the Winter of 2001 to review information collected about pollutant load to the lake, including the preliminary results of the Devil's Lake Mercury Pilot Study. Review changes in the TMDL regulations and guidance.

4) Convene a series of stakeholder meetings or workshops to inform the development of a draft Lake Superior TMDL Strategy.

EPA has not yet developed a final schedule for the next steps. EPA welcomes comments on the proposed next steps, a schedule of activities, and any issues raised in this strategy planning document.

APPENDIX A

REVIEW ELEMENTS OF TMDLs

Section 303(d) of the Clean Water Act (CWA) and the U.S. Environmental Protection Agency's Code of Federal Regulations Part 130, and the Water Quality Guidance for the Great Lakes System (40 CFR Part 132) describe the statutory and regulatory requirements for approvable Total Maximum Daily Loads (TMDL). EPA generally requires the following information to determine whether a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations; the information should be included in the submittal package. Use of the verb "must" below denotes information that is required because it is related to elements of the TMDL required under the CWA and by regulation.

1. Description of Waterbody, Pollutant of Concern, Pollutant Sources and Priority Ranking

The TMDL analytical document must identify the waterbody as it appears on the state's or tribe's 303(d) list, the pollutant of concern, and the priority ranking of the waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. When it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and wasteload allocations that are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information that affects the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and (4) explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments or chlorophyl *a* and phosphorus loadings for excess algae.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable state's or tribe's water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. Such information is necessary for EPA's review of the load and wasteload allocations that are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, a numeric expression, usually site specific, must be developed from a narrative criterion, and a description of the process used to derive the target must be included in the submittal.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards (40 CFR § 130.2(f)). It is required that the loadings be

expressed as either mass-per-time, toxicity, or other appropriate measure (40 CFR § 130.2(I)). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, the method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results of water quality modeling, and more. Such information is necessary for EPA's review of the load and wasteload allocations that are required by regulation.

In many circumstances, a critical condition must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 CFR § 130.7(c)(1)). The critical condition can be thought of as the "worst-case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. *Critical condition*s are the combination of environmental factors (for example, flow temperature and others) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. *Critical conditions* are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may be necessary to meet water quality standards. Stream design guidelines for Great Lakes tributaries are specified under 40 CFR Part 132, Appendix F.

4. Load Allocations

EPA regulations require that a TMDL include load allocations (LAs), which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 CFR. § 130.2(g) and 40 CFR 132, Appendix F). Load nonpoint sources, load allocations should be described separately for background allocations may range from reasonably accurate estimates to gross allotments (40 CFR § 130.2(g)). When it is possible to separate natural background from and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, the TMDL must include a discussion of the reasoning behind that decision, since a zero LA implies that an allocation only to point sources will result in attainment of the applicable water quality standard and that all nonpoint and background sources will be removed.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include wasteload allocations (WLA), which identify the portion of the loading capacity allocated to existing and future point sources (40 CFR § 130.2(h) and 40 CFR 132, Appendix F). If no point sources are present, or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, the TMDL must include a discussion of the reasoning behind this decision, since a zero WLA implies that an allocation only to nonpoint sources and background will result in attainment of the applicable water quality standard and that all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a

portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern, or if the source is included in an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation on the basis of an assumption that nonpoint source load reductions will occur. In such cases, the state or tribe will be required to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

6. Margin of Safety

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge about the relationship between load and WLAs and water quality (CWA § 303(d)(1)(C), 40 CFR §130.7(c)(1), and 40 CFR 132, Appendix F). EPA guidance explains that the MOS may be implicit, that is, incorporated into the TMDL through conservative assumptions in the analysis, or explicit, that is, expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described (CWA § 303(d)(1)(C), 40 CFR § 130.7(c)(1)).

8. Monitoring Plan for TMDLs Developed Under the Phased Approach

EPA's 1991 document *Guidance for Water Quality-Based Decisions:* The TMDL Process (EPA 440/4-91-001) recommends a monitoring plan when a TMDL is developed under the phased approach. The guidance recommends that a TMDL developed under the phased approach also should provide assurances that nonpoint source controls will achieve expected load reductions. The phased approach is appropriate when a TMDL involves both point and nonpoint sources and the point source is given a less stringent wasteload allocation on the basis of an assumption that nonpoint source load reductions will occur. EPA's guidance provides that a TMDL developed under the phased approach should include a monitoring plan that describes the additional data to be collected to determine whether the load reductions required by the TMDL will lead to attainment of water quality standards.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs the regions to work in partnership with states and tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To that end, the memorandum asks that Regions assist States/Tribes in developing

implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by EPA, they help establish the basis for EPA's approval of TMDLs.

10. Reasonable Assurances

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, when a point source is given a less stringent wasteload allocation on the basis of an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will take place must be explained if the TMDL is to be approvable. The information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a water impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required for a TMDL to be approvable. However, for such nonpoint source-only waters, states and tribes are strongly encouraged to provide reasonable assurances about achievement of load allocations in the implementation plans described in section 9 above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in state's or tribe's implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

11. Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each state or tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 CFR § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the state's or tribe's public participation process, including a summary of significant comments and the state's or tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require that EPA publish a notice seeking public comment (40 CFR § 130.7(d)(2)).

Inadequate public participation could be a basis for disapproving a TMDL; however, when EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the state or tribe or by EPA.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document; the letter should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the CWA for review and approval. The procedure clearly establishes the state's or tribe's intent to submit, and EPA's duty to review, the TMDL under the statute.

The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, the pollutant(s) of concern, and the priority ranking of the waterbody.